

The failure to observe honeyeaters foraging on *D. microcephala* is interesting in view of the predominance of grains of this species in the pollen loads of captured birds. This discrepancy may merely reflect deficiencies in the observational data. Alternatively, if these data reflect the real situation, it is possible that honeyeaters fed more frequently on *D. microcephala* and picked up substantial amounts of its pollen at some time of the day other than in the early morning. However, even if this did not occur, the compact arrangement of relatively large anthers in *Diplolaena* inflorescences (Fig. 1) would conceivably transfer much more pollen to a honeyeater probing for nectar on an occasional visit than would the more open array of small pollen-presenters found on *Grevillea rogersoniana* and *Banksia ashbyi* inflorescences. Indeed, it may be that the floral morphology and pollen production of *Diplolaena microcephala* were favoured by natural selection as devices to compensate for low visitation rates by honeyeaters in the face of competition from copious nectar-producing plants such as *Grevillea rogersoniana*. A critical examination of this and similar hypotheses would contribute towards further understanding of the divergent ways in which these plants exploit the service of their common pollinators.

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THE AVIFAUNA OF GARDEN ISLAND, COCKBURN SOUND

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Although this relatively large island, of area 1,100 ha, is close to the mainland, it paradoxically has been less thoroughly studied by ornithologists than Rottnest Island. In 1978 the naval facility HMAS Stirling was commissioned and subsequently there was much public discussion on the question of public access to this Commonwealth-owned island. It is therefore timely to publish an up-to-date list of bird species, comprising those recorded by earlier workers over twenty years ago as well as species recorded by me since 1974.

Those who have published their records are Alexander (1921), Serventy (1938), Sedgwick (1940), Buller (1949) and Calderwood (1953). Calderwood's list was based on a visit of one day and Sedgwick's list was the result of two visits, Serventy made six visits, each of a few hours' duration whereas Buller's list resulted from a five day visit. It is likely that these visitors concentrated on the southern parts of the island. All of my visits were made after a causeway was constructed to the island, so I have had the advantage of motor transport in covering much of the island. As well, most of the island was traversed on foot. The dates of my visits are: 26 June 1974, 13-15 (inclusive) September 1974, 7-15 February 1975, 18 August 1975, 12 December 1975 and 11 August 1978. In my February visit I mist-netted and banded birds in an *Acacia rostellifera*/*Melaleuca lanceolata* low closed-forest near the Zoology Research Station.

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In the following annotated list I mention all published records. Common names and the order of species follow Serventy and Whittell (1976).

Pied Cormorant. Sedgwick.

Little Pied Cormorant. Sedgwick.

Reef Heron. Sedgwick.

Mountain Duck. On 18 August 1975 I flushed a bird from a sink hole in aeolianite, probably a nesting site, on the west coast. One pair with several ducklings was seen on an artificial pond in September 1978 (R. Cranfield, pers. comm.).

Osprey. One nest known (Abbott, 1977).

Kestrel. I have never seen more than one pair on the island. Also recorded by Alexander, Serventy (as a permanent resident), Sedgwick and Calderwood.

Pied Oystercatcher. Recorded by Sedgwick and me.

Banded Plover. Buller.

Grey Plover. Sedgwick.

Red-capped Dotterel. Sedgwick.

Red-necked Stint. Sedgwick.

Sharp-tailed Sandpiper. Sedgwick.

Southern Skua. One flew over the northern end on 18 August 1975.

Silver Gull. Recorded by Sedgwick and me.

Crested Tern. Recorded by Sedgwick and me.

Caspian Tern. Single birds on three of my visits.

Fairy Tern. Sedgwick recorded young birds at Careening Bay. I have been told by occupants of huts on the northern part of the island of large numbers of what must have been this species breeding on beaches on the eastern coast.

Domestic Pigeon. Recorded as 'fairly numerous' by Calderwood.

Spotted Turtle-dove. Self-introduced resident. Rarer than the next species. Recorded also by Serventy (as occasional visitor, possibly established), Sedgwick, Buller (in appreciable numbers) and Calderwood.

Senegal Turtle-dove. Self-introduced resident. Common and widespread. Previously recorded by Alexander (as straggler), Serventy (occasional visitor), Sedgwick, Buller (in appreciable numbers) and Calderwood.

Brush Bronzewing. Resident. Common on my first visit, but less so thereafter; only two were seen on my last visit. This species feeds on the fruits of *Solanum symonii*, a very common plant species in disturbed areas on the island. Previously recorded only by Alexander. Perhaps this species undergoes a cycle in its population size.

Rock Parrot. Vagrant. I saw one bird on 15 September 1974 in *Acacia rostellifera* low closed-forest.

Pallid Cuckoo. Vagrant. Single birds recorded 26 June 1974 and 8 February 1975 (this last banded).

Golden Bronze Cuckoo. Vagrant. One bird recorded by Buller.

Laughing Kookaburra. Only record is that of Serventy (as occasional visitor).

Sacred Kingfisher. Status uncertain, but probably a regular non-breeding visitor. Recorded by Sedgwick and Calderwood and on 8 February 1975 (one banded) and 11 August 1978.

Welcome Swallow. Common resident. Also recorded by Serventy (as permanent resident), Sedgwick, Buller and Calderwood.

Tree-Martin. Vagrant. Serventy and Calderwood.

Australian Pipit. Probably a rare resident. I have recorded it twice. Sedgwick, Buller and Calderwood also record it.

Western Warbler. Common resident. Categorized as a visitor by Serventy, and also recorded by Sedgwick, Buller and Calderwood.

Grey Fantail. Common resident. Recorded previously by Sedgwick, Buller and Calderwood.

Willy Wagtail. Common resident. Recorded earlier by Alexander, Sedgwick, Buller and Calderwood. This species shows evidence of niche shift on the island (Abbott, 1976).

Golden Whistler. Common resident. Serventy records hearing a whistler which was probably this species; Sedgwick, Buller and Calderwood record the species.

Western Silveryeye. Very common resident, the numbers of which are no doubt augmented at various times of the year by mainland birds. Recorded also by Alexander, Serventy (as permanent resident), Sedgwick, Buller and Calderwood. The last two class it as the commonest bird on the island.

Singing Honeyeater. Common resident. Earlier recorded by Serventy (as a visitor), Sedgwick, Buller and Calderwood.

White-fronted Chat. The only record is by Alexander.

Grey Butcher-bird. Common resident. Previous records were made by Serventy (as occasional visitor), Sedgwick, Buller and Calderwood.

Western Magpie. Occasional visitor. I have recorded magpies on three occasions, the largest number present being eight. Classed by Serventy as a visitor, and also recorded by Sedgwick, Buller and Calderwood.

Australian Raven. Common resident, doubtless commoner than previously as there is now a large rubbish dump on the island. Earlier recorded by Serventy (permanent resident), Sedgwick and Buller.

In summary, forty bird species have been recorded on Garden Island to date, much less than the number recorded on Rottnest (Storr, 1964). This surely reflects ornithological interest in the two islands. I expect that future visitors will add to the list of waders; I have devoted little of my time to them. Of the 40 species recorded, one seabird, one duck, the Osprey and fourteen species of landbirds breed on Garden Island. The paucity of breeding seabirds is in marked contrast to neighbouring islands (Abbott, 1977).

BIRD SPECIES OF PARTICULAR INTEREST

In my opinion the Brush Bronzewing is endangered. Although man has benefited this species to a certain extent by clearing limited areas of the island and thereby allowing one of its favoured food plants *Solanum symonii* to proliferate, he has also linked the island to the mainland by a causeway. This has allowed feral cats to gain access to the island. I am therefore not sanguine about the survival of this population, of especial interest now that the species is long extinct on Rottnest (Storr, 1964) and the coastal plain near Perth (Serventy and Whittell, 1976).

The Willy Wagtail on Garden Island lives in a habitat quite unlike its preferred habitat on the mainland. It is also the only insular population in South-western Australia, even though the species is often recorded as a vagrant on many other such islands. The Golden Whistler, which is endangered on Rottnest through clearing of its habitat, survives in good numbers on Garden Island. This species long ago disappeared from the coastal plain near Perth (Serventy and Whittell, 1976). The remaining species of interest is the Grey Butcher-bird. Only one other island in South-western Australia has a population of this species. On the adjacent mainland, such as at Woodman Point and Swanbourne Rifle Range, this species seems to require high perches to make the wattle scrub suitable habitat. Tuarts usually satisfy this requirement. Grey Butcher-birds are

therefore another species that live in a slightly different habitat from that preferred on the adjacent mainland.

COMPARISONS WITH LANDBIRD FAUNA OF ROTTNEST ISLAND

Some puzzling results follow from a comparison of the landbird faunas of Garden Island and Rottneest Island. Three species, Grey Fantail, Willy Wagtail and Grey Butcher-bird, are found only on Garden Island, although the first two have been recorded on Rottneest as occasional visitors or as vagrants (Storr, 1964). Nearly twice as many species are (or were) found on Rottneest alone: Rock Parrot, Rufous Whistler (extinct), Red-capped Robin, Spotted Scrub-Wren and White-fronted Chat. Ten species are held in common, namely Kestrel, Senegal Turtle-dove, Indian Turtle-dove, Welcome Swallow, Golden Whistler, Western Warbler (colonized Rottneest about 1950), Singing Honeyeater, Western Silvereye, Australian Pipit and Australian Raven. At first it is easy to see why the Chat is absent from Garden Island, because Rottneest has extensive salt lakes surrounded by samphire. However, Chats also occur toward the western part of the island. For this reason, parts of Garden Island should be suitable for them. I can see no obvious ecological reason why the three species only on Garden Island should not occur on Rottneest Island, or why the five found only on Rottneest should not be on Garden. It is too facile to attribute these disjunctions to interspecific competition. Nevertheless, these distribution patterns are no less interesting than the well known vicarious distributions of Tamar and Quokka, and of Tiger Snake and Dugite, on Garden and Rottneest Islands.

RELATIVE ABUNDANCE OF LANDBIRD SPECIES ON ROTTNEST AND GARDEN ISLANDS

Mist nets were operated on Rottneest Island for 1-8 December 1974 and on Garden Island for 7-14 February 1975. The habitat studied on Rottneest consisted of *Acacia rostellifera* low closed-forest interspersed with low heath, whereas that on Garden Island was taller *Acacia rostellifera* low closed-forest mixed with some *Melaleuca lanceolata*. The following table shows the number of individuals of the species netted in these habitats.

	Rottneest I.	Garden I.
Pallid Cuckoo		1
Sacred Kingfisher		1
Welcome Swallow	4	
Grey Fantail		2
Willy Wagtail		4
Golden Whistler		7
Singing Honeyeater	3	7
Western Silvereye	36	4
TOTAL ABUNDANCE	43	26
TOTAL NO. SPECIES NETTED	3	7
TOTAL NO. NET-HOURS	383	297

On Garden Island more species were netted but these belonged to fewer individuals than on Rottneest. These differences have been shown in a wider study of South-western Australian islands to correlate well with differences in vegetation structure between the habitats sampled (Abbott, 1978).

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**BLUE-GREEN ALGAE IN NECTAR OF *BANKSIA*
aff. *SPHAEROCARPA***

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Inspection of numerous plants of the *Banksia* aff. *sphaerocarpa* R. Br. complex has shown that the nectar at the base of the flowers is invariably olive green (Fig. 1). This change from the original transparent, lemon colour occurs within one or two days of the flowers opening. As the



Fig. 1.—Flower head of *Banksia* aff. *sphaerocarpa* beginning to open. Already nectar at the base of the open flowers has turned dark green due to the presence of blue-green algae (arrow). Scale = 4 cm.